Historic, archived document

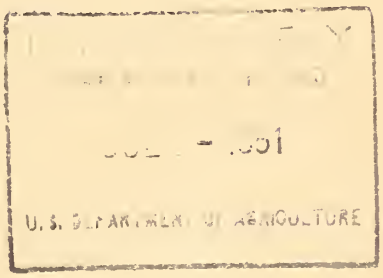
Do not assume content reflects current scientific knowledge, policies, or practices.

63
rve

FOREIGN AGRICULTURE REPORT

OFFICE OF
FOREIGN AGRICULTURAL RELATIONS
U.S. DEPARTMENT OF AGRICULTURE
WASHINGTON, D.C.

A STUDY OF THE CITRUS INDUSTRY OF LEBANON



by

J. HENRY BURKE
Marketing Specialist

FOREIGN AGRICULTURE REPORT No. 58 MAY 1951

F O R E W O R D

The Mediterranean region is the home of the commercial citrus industry. Since the beginning of the present century, the commercial importance of the eastern countries of that region, particularly Palestine, has increased materially. The potential of this section is therefore of considerable importance to the expanding citrus industry of the United States.

This study deals with the small citrus industry in Lebanon. The industry is primarily of local and regional importance, but could be developed to compete in European markets. Economic information is not well documented, and in many cases estimates are the only basis of evaluation.

This study was made in the interest of the United States citrus industry by the Office of Foreign Agricultural Relations under the provisions of the Research and Marketing Act as a part of the program to develop and maintain foreign markets for agricultural commodities.

The possibilities of broadening and maintaining foreign markets for other agricultural commodities also are being studied by this Office, and the findings are presented in other circulars and reports that may be obtained from the Office of Foreign Agricultural Relations, United States Department of Agriculture, Washington 25, D. C.

Joseph A. Becker, Chief
International Commodities Branch

U. S. DEPARTMENT OF AGRICULTURE NEG. 1640 OFFICE OF FOREIGN AGRICULTURAL RELATIONS

INTRODUCTION AND SUMMARY

Lebanon is a small country of only about 4,000 square miles with a population of about 1,250,000 inhabitants 1/. In addition to this large native population the thousands of refugees from Palestine have added to the immediate problems of wages, food, and housing. It is a new republic attempting to build a more modern society on the culture of its ancient past.

The mountainous nature of much of the country creates many climates, and Lebanon can raise a wide range of crops from tropical to temperate. Certain parts of the country are irrigated, but as yet, many water resources are undeveloped.

Because of low wages and the difficulty of using mechanical equipment in many areas, the crops are largely cultivated by hand. This is true of citrus; although the hand culture is not as expert as in Spain or Italy, it seems, on the whole, to be suited to the country.

Citrus production in Lebanon includes sweet oranges, tangerines, bitter oranges, lemons, and sweet limes. Lebanon is one of the sources of the Shamouti orange.

During favorable growing years recently the total citrus production has reached approximately 2 1/4 million boxes, with sweet oranges and lemons being the most important. The trend of production since 1942-43 has not changed greatly except for variations due to such factors as weather conditions. The marketing of citrus in Lebanon continues to be simple even today, and the domestic market is its most significant outlet. As to exports, its most important European customers are France and Czechoslovakia, with sizeable quantities going to several Middle Eastern neighbors, particularly Syria. Any appreciable curtailment of shipments to Syria causes apprehension among exporters and dealers lest a local surplus might develop, thus depressing prices. For that reason the possibilities of developing European markets are being explored. The major problem confronting exporters of citrus is that of fruit decay.

1/ Report of the United States-Lebanon Agricultural Mission, I. A. C. Series, No. 7, September 1948, OFAR, USDA.

Table 1.-Lebanon: Estimated Citrus Acreage, by Variety and Province, 1950

Province	Sweet oranges		Bitter oranges		Tangerines		Lemons		Total 1/	
	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres
North Lebanon	2,000	4,942	150	371	250	618	800	1,976	3,200	7,907
Mount Lebanon	1,200	2,965	100	247	75	185	400	989	1,775	4,386
South Lebanon	1,300	3,212	50	124	75	185	300	742	1,725	4,263
Total	4,500	11,119	300	742	400	988	1,500	3,707	6,700	16,556

1/ Excludes sweet limes, sweet lemons, and grapefruits. These minor varieties would not make a significant addition to indicated acreage.

Source: As reported by trade sources to J. Forrest Crawford.

LOCATION OF CITRUS DISTRICTS AND CITRUS ACREAGE 2/

Location

The general locations of the more important Lebanese citrus producing areas are indicated on the accompanying map.

Nearly half of Lebanon's citrus production are in North Lebanon where Tripoli is the center of the industry. According to acreage estimates, approximately 7,907 acres of citrus are planted in this district.

The next most important district is Mount Lebanon where Antelias near Beirut is the center of the industry. Here approximately 4,386 acres of citrus is planted.

The third citrus district is that of South Lebanon where approximately 4,263 acres are planted, with centers of production near Tyre and Sidon.

The commercial varieties of sweet oranges, bitter oranges, tangerines, and lemons are fairly evenly divided among the districts, and the percentage of area devoted to each is about equal to its total importance in the industry.

Acreage

The figures on citrus acreage in Table 1 should be considered as rough estimates only. Much of the Lebanon's citrus is mixed planting of citrus varieties and other crops, such as loquats, bananas, and mulberry trees. With this in mind, the area planted to sweet oranges is estimated at about 11,119 acres and that planted to sour lemons at about 3,707 acres. The estimates of 742 acres for bitter oranges and 988 acres for tangerines should be regarded as even less precise. Tangerines and bitter oranges are seldom planted in groves; they are usually interplanted with other citrus varieties and other crops in numerous small gardens along the coast where water is available for irrigation.

2/ From a report by J. Forrest Crawford.

CLIMATE AND PHYSICAL FEATURES

Lebanon is located on the eastern Mediterranean between Israel and Syria and has an area of about 4,000 square miles.

Paralleling the cost are the Lebanon mountains which reach heights of 8,000 to 11,000 feet east of Beirut.

Because of the mountainous nature of much of Lebanon there is a great difference in climate within short distances. The coastal plain, where the citrus districts are located, is warm and humid. Up the slopes of the mountains, a short distance away, it is much drier and cooler, and here deciduous crops are grown.

Rainfall in the coastal citrus area averages 20 to 30 inches a year, practically all of which falls from November to March when the prevailing winds are from the Mediterranean. The summer months from May to September are a dry season. A hot desert wind which usually occurs in the summer is a climatic hazard which occasionally damages citrus.

The high rainfall and the snow from the mountains give the coastal plain an excellent supply of water, but most of the water supply is undeveloped.

Because of the humidity the temperature in the citrus area is normally fairly even and mild, as is evident by bananas and citrus being grown together as a commercial crop.

The nature of the climate is further illustrated by the ripening characteristics of the oranges. These were green to breaking in color in mid-November when considered mature enough for export.

Although the climate is usually mild, severe frosts sometimes occur. In January and February 1950 minimum temperatures reached -3° to -4°C (26.6° to 24.8°F) in citrus groves, causing fruit and tree damage. Citrus growers in Lebanon state that such frosts may be expected every 10 or 20 years.

Table 2.-Monthly Climatic Data as Observed at Ksara

Month	Temperature		Rainfall	Relative Humidity
	Minimum	Maximum		
	°F	°F	Inches	Percent
January	24.80	61.7	6.15	80
February	33.08	65.84	8.33	80
March	30.38	74.62	3.14	68
April	38.48	80.78	1.31	65
May	42.26	92.84	.09	56
June	50.90	94.1	.24	57
July	53.06	95.54	0	47
August	55.04	94.64	0	41
September	47.48	98.42	.08	47
October	44.24	89.24	.03	48
November	32.72	76.82	1.00	62
December	26.24	65.84	6.19	77
Total	.....	.....	26.56	.....

Source: Annales 1931 de l'observatoire de Ksara, Lebanon, pp. 209, 224-5. Ksara is near, but not in, a citrus area.

Table 3.-Lebanon: Citrus Production, 1942-43 to 1950-51

Year	Sweet oranges		Tangerines		Bitter oranges		Lemons		Sweet limes	
	Metric tons	Boxes	Metric tons	Boxes	Metric tons	Boxes	Metric tons	Boxes	Metric tons	Boxes
1942-43	37,000	1,167,808					25,000	725,197		
1943-44	34,760	1,094,741					8,750	253,819		
1944-45	26,250	826,725					11,590	336,202		
1945-46	40,000	1,259,771	6,000	188,966	3,000	94,483	25,000	725,197	300	9,448
1946-47	30,000	944,829	5,500	173,219	2,700	85,035	15,000	435,118	250	7,874
1947-48	40,000	1,259,771	8,000	251,954	4,000	125,977	20,000	580,158	400	12,598
1948-49	20,000	629,886	8,000	251,954	4,000	125,977	12,000	348,095	400	12,598
1949-50	22,000	692,874	3,500	110,230	3,000	94,483	10,000	290,079	400	12,598
1950-51	32,000	1,007,817	3,500	110,230	3,000	94,483	12,500	362,599	400	12,598

Source: Estimates from government and trade sources.

PRODUCTION

Statistics on citrus production in Lebanon are estimates made by both government officials and the trade. Fruit from the many small groves is sold in small lots to fruit buyers or locally, and records of quantities are not kept. The government and trade figures were confirmed during a survey of the more important citrus areas and are believed to reflect production fairly accurately with some exceptions noted below.

Orange production has not changed greatly since the 1942-43 season, although adverse weather in the past two seasons has kept production lower than it would have been otherwise. The area planted to sweet oranges indicates that a potential production of 1,250,000 boxes is possible under favorable conditions.

The statistics indicate that tangerine production has declined in recent years; however, this may be merely an adjustment of previous overestimates. With the acreage observed on the survey of the Lebanon citrus areas, a production of 110,230 boxes per year is much more reasonable than the higher figures estimated in previous years.

The production of bitter or Seville oranges is even more difficult to estimate because this variety is usually not planted in groves but is interplanted with other citrus varieties and with other crops, such as bananas. A production of 94,483 boxes a year seems reasonable and this is not likely to change much in the future.

The present production of sour lemons is smaller than in the past, because of recent unfavorable weather. Under favorable conditions, a production of 750,000 boxes a year should be possible. Sour lemons are second in importance only to sweet oranges.

Sweet limes are a minor variety which is grown for local consumption and for use as a rootstock for sweet oranges. This type of fruit is much appreciated by the local Arab population. Production will probably remain small at about present levels.

VARIETIES 3/

Varieties of citrus except for the Shamouti are not well defined. The data below were compiled from published information, and facts obtained by Dr. Crawford.

Oranges

"Bizri" or Baladi (Beledy) (Beladi): A local seeded, non-blood, thin-skinned variety produced primarily for local consumption. This is probably not a variety but a group of "seedlings." It probably also is representative of the parent of the Shamouti which is a mutation of a round-seeded variety. The fruits of this variety are smaller than the Shamouti to which it is next in importance in Lebanon.

"Noghrabi": This is a sweet-scented non-blood orange of minor importance.

"Mawardi": This is a local blood orange of minor importance.

"Satsuma," "Valencia," and "Navel": These varieties have been introduced into Lebanon, but commercial planting is very small.

"Shamouti" (Jaffa): This variety is of major importance in Lebanon, representing about 65 percent of the total orange production. Two strains of this variety are recognized in Lebanon: the Shamouti (Yafawi) or regular thick-skinned variety is predominant in the Antelias and Tyre districts and represents about 65 percent of the plantings in the Tripoli district; the Shamouti (Baladi) is an earlier, thinner skinned fruit which represent about 25 percent of the production in the Sidon district.

In reporting this varietal differentiation recognized in Lebanon, attention is directed to the fact that the Shamouti is an erratic variety, producing fruit which differ widely on different rootstocks. Like all citrus it is also sensitive to climatic and soil differences. This varietal difference may be due to separate and different strains or it may be the result of soil, climate, or rootstock differences.

The Shamouti fruit seen in Lebanon were large with a rather rough peel. Most fruit had the characteristic flat or depressed area at the stem end. In mid-November the fruit was green or only breaking in color, although it was considered mature enough to export and picking was in progress.

3/ Most of this information on varieties is from a report by J. Forrest Crawford.

Tangerines

A fairly large crop of tangerines is raised in Lebanon for domestic consumption. The fruit seen in the second week in November 1950 was only beginning to break in color, yet picking was in process for the local market.

Bitter or Seville Oranges

This is a minor variety raised both for export and local consumption. It is produced for its fruit and also as a source of leaves and blossoms for byproducts such as orange-flower oil.

Grapefruit

This is also a minor variety raised for domestic consumption.

Lemons

The sour lemon is a major variety which is grown for both domestic consumption and export. Specific varieties raised are unknown.

Sweet Limes

This variety is grown both for a fresh fruit and as a rootstock for sweet orange trees.

Sweet Lemons

There is a small production of this variety which is consumed locally, primarily by the Arab population.

CULTURAL PRACTICES

The Lebanese citrus industry is composed of small growers, many of whom produce citrus as part of a "jardinage" or garden culture. The areas where irrigated agriculture is possible lie along the seacoast; here, the density of population of about 1,200 persons per square mile has created an intensive agriculture using hand cultivation. In many respects the citrus industry of Lebanon is much like that of Italy, although Italian cultural methods seem to be generally more expert than those employed in Lebanon.

Size of the Groves

Most citrus groves in Lebanon are small family orchards of 2 to 10 acres each, with the smaller size holdings being most common. Orchards of more than 10 acres are rare, and only a small percentage of production is estimated to come from extensive citrus culture.

Many groves are on sloping ground, some of which is terraced; thus, terrain limits the size of many properties.

Growers estimate that a family can make a living from the cultivation of a little more than an acre using the intensive "garden culture" by which citrus and other irrigated crops are raised.

Planting Distance

The distance at which citrus trees are planted varies from one district to another and within districts depending on terrain and age of the grove.

In a 20-year-old grove observed in South Lebanon near Tyre the trees were planted at least 20 feet apart, but this is the exception in Lebanese citrus cultural practice.

Also near Tyre a young grove was observed with trees planted about 20 feet by 20 feet. This grove happened to be cultivated by a tractor, which is also unusual. In each location the grower had planted two 1-year-old trees 4 inches apart. Both trees were budded in the field to sweet orange varieties. One tree was a sweet lime and the other a bitter or sour orange stock. The purpose of this was apparently to attempt to obtain the same effect as inarching sweet orange trees on sweet lime with sour or bitter orange rootstock. This was the only example of this type of orchard development observed in the Middle East.

Other groves observed near Sidon and Tripoli were very closely planted, with trees only 10 feet apart in many cases. This type of orchard may have as many as 300 trees to the acre.

Mixed Planting

Most citrus groves are mixed plantings of different citrus varieties or of citrus and other crops such as loquats, bananas, and mulberry trees. In only a few instances are orchards planted to one variety of citrus. The owner of a young grove seen near Tyre had interplanted bananas and loquats with citrus, with the intention of removing the bananas after the citrus had reached bearing age. The bananas were planted as a quick cash crop, but they may not be removed because they are at present a more profitable crop than citrus.

Bananas are the crop most commonly interplanted and this is an unusual combination since most climates where bananas can be raised are unfavorable to commercial citrus.

Left. A typical view of the coastline of Lebanon showing the narrow coastal plain in which citrus is raised.

Right. An orange garden in Lebanon.

Below. A closely planted well-cared-for grove with at least 200 trees to the acre.

Below. A grove near Tyre with trees planted at almost normal distances. Note that a "turf" non-tillage culture is being used.

A young grove near Tyre interplanted with bananas and loquats.

A closely planted grove of citrus and bananas.

The short-handled "hoe" which is used for cultivation.

A young grove by the seashore in the new irrigation district in South Lebanon. Here two trees are planted in each location, one a sweet lime root and the other a bitter orange.

Hand Cultivation

Most orchards are cultivated by hand with a short-handled, hoe-like tool. This practice permits mixed plantings and intensive land use.

Only one grove was seen in which citrus was being raised without tillage. This grove had a turf cover.

Some plantings are being made near Tyre, where the new irrigation project of Guaamiyeh is being completed. A few newly planted groves in this area are cultivated mechanically; however, the majority of Lebanon citrus areas are unsuited to mechanical tillage because of the nature of the terrain, size of grove, and method of planting.

Pruning

The lower limbs of the trees are pruned so that hand cultivation can be practiced in the closely planted gardens. Heavy pruning such as is practiced in Spain in orange production is apparently not used extensively here.

Fertilization

Not all Lebanese groves are fertilized; however, good practice is to apply about 4 pounds of mineral fertilizer such as nitrate of lime or sulfate of ammonia or 4 pounds of superphosphate and 1 pound of potash per tree per year and about 70 pounds of manure per tree per year.

Goat manure, which is available locally, is the most important type of fertilizer used. Only about 10 percent of the groves receive mineral fertilizer.

The condition of most groves visited indicated that excellent to fair fertilization programs are used.

Drainage

Since most orchards are on sloping ground near the seashore and since 8 inches of rain may fall in one month, orchard drainage is an important problem. Many of the terraced groves have elaborate drainage systems of stone or concrete open ditches to control erosion during the season of heavy rainfall. The construction of the drainage and irrigation systems is a major item of cost in preparing terraced land for irrigated culture.

Irrigation

Because of the terrain and high rainfall Lebanon has a large potential supply of water which can be used for irrigation. At present only a small part of this potential is being used, but projects are under construction which will bring new land under irrigation in the future.

At present most irrigated land is located near streams or rivers where gravity water can be obtained. Some wells have been dug to water-bearing strata.

Most irrigation systems are square, open ditches of stone or concrete which carry water to the grove. In the grove, water is applied in basins around each tree. About six irrigations are normal each year.

The unirrigated land is usually sloping, stony, and eroded. It appears to be unfavorable for any type of agriculture, but when it is irrigated and terraced it becomes remarkably productive.

Most land observed in the coastal plain of Lebanon which could be brought under irrigation is not suited to mechanical tillage.

Windbreaks

Windbreaks of Italian cypress are used to protect the citrus groves from the occasional strong winds from the Mediterranean and the hot, dry, summer winds from the desert.

Pests and Pest Control

The most important pest, known locally as "Black Scale," is really the Florida red scale (Chrysomphalus aonidum). This pest infests nearly every orchard, and most fruit seen in packing houses had this scale on it. Only a small percentage of groves are sprayed each year, but trade sources indicate that pest control practices are improving. Oil sprays are used to control this scale, and "Volk" is popular in 1½ percent to 2 percent solutions. Close and mixed plantings complicate the problem of effectively applying oil sprays.

A rust mite, which leaves a grey film on fruit, is also a problem, and two sprayings a year with lime sulfur solution are necessary to obtain control. Only a small percentage of the groves are treated.

The Mediterranean fruit fly is also a serious pest. It damages fruit in the fall until December when the heavy rains lower the temperature to a point unfavorable to fruit fly development. It is usually active again about March, the beginning of warmer weather.

Fruit which has been stung by the fruit fly can be graded out at the packing house, as an area of lighter color soon appears around each sting. Damaged fruit quickly colors after being stung by the fly. In packing houses, fruit is usually held a day or so before packing so that the appearance of these signs may aid grading.

Early picking is the chief measure taken to protect fruit from this damaging insect. Powered wheeled spray rigs are usually impractical in the small, closely planted orchards and most spraying is accomplished by

small portable pumps. Pest control companies have made a beginning in offering a spraying service. No fumigation is used.

Disease and Disease Control

Gummosis was observed in some orchards planted on heavy soil.

"Scaly bark" or psorosis was also seen. Since there is no tree certification in Lebanon and many growers do their propagation on seedlings planted in the orchard, this virus disease may be expected to spread.

As the fungus disease, "mal secco," is present in citrus areas in neighboring countries, it may also exist in Lebanon. However, no infected trees were observed in the orchards visited.

No evidence of "quick decline" was seen in any area of Lebanon.

Nurseries

The district near Jounie is important for the growing of nursery stock. The operator of one nursery said that about 50 percent of the trees were sold as seedlings. Of the budded trees sold, about 80 percent were Shamouti, 10 percent sour lemons, and 10 percent tangerines, sweet lemons, sweet limes, and grapefruit.

In 1950 seedling trees ready to set in the grove for budding were selling for 0.50 Lebanese pounds (14 U.S. cents) each; budded trees were selling for 1.25 to 2.00 Lebanese pounds (34 to 54 U.S. cents) each.

MARKETING

Lebanese citrus marketing is not highly organized. The small grower usually sells his crop to a fruit buyer who may supply the local market or sell to an exporter. As a rule, only one variety is sold at a time. Thus, a grower will sell the seeded Baladi at a different time and ordinarily at a different price from the Shamouti. In most cases the picking is done by the grower and the fruit is sold by weight at the grove.

Harvesting

In Lebanon, harvesting of oranges begins in November. The pickers use a freestanding double ladder (see photo) in the closely planted groves because the branches left after pruning are too weak to support an ordinary ladder.

The pickers do not wear canvas gloves, and they pick the fruit by clipping with what we would call pruning shears. These practices probably injure much of the fruit and help to cause the decay which has been a problem in Lebanese export shipments in recent years.

The picked fruit is placed in a reed cylindrical basket carried by means of a shoulder strap. The filled baskets, containing about 10 to 15 pounds of fruit, are placed under the tree. A "porter" collects about six baskets at a time and carries them from the grove to the weighing point. There, the fruit is transferred to burlap bags, weighed, and loaded on a donkey to be carried to the packing house. Each donkey carries two bags of oranges, one on each side in wicker hampers. When the donkeys are all en route to the packing house, the fruit is piled on mats on the ground, where it is collected until transport is available.

These simple harvest methods are suited to Lebanon citrus culture, for only men and donkeys can reach many of the closely planted terrace groves.

Export Packing

All the packing houses observed were small, and the simple packing operations are performed by hand on the floor. The only machinery used are powered saws for the production of box shook, which is often made at or near the packing houses. Local logs 3 or 4 feet in length are the source of much of the Lebanon shook.

When the fruit arrives at the packing house, usually by donkey, it is emptied from the bags into piles 3 or 4 feet deep on the floor of the packing house. The fruit may stay piled for a day or so to "cure" before the packing process begins. Since it is not washed in the packing process, the fruit is packed from these piles.

Most of the oranges seen were heavily infested with the round black "Florida red" scale. The scale is brushed off the fruit by hand with a "brush," which is made by cutting a strip of rubber about 3 inches wide from the inner tube of an automobile tire and then rolling it into a tight roll tied with twine. Since nearly all of the fruit seen was infested, scale removal is a slow process. The scale can be removed by these methods, but the fruit deteriorates in keeping qualities.

After the scale is removed, the fruit is sight-graded, calibrated, and wrapped in tissues. The wrapped fruit is usually placed in piles or baskets according to grade and size. As a rule, the scale removal, grading, and calibration are performed by women, while the packing of the wrapped fruit is done by men.

The tissue wraps observed were made in California and were impregnated with diphenyl. As yet this is not a general practice, and some nontreated wraps are also used.

A normal crop of Shamouti oranges.

On the left is the round seeded Baladi orange and on the right the larger Shamouti.

Right. A porter dumping fruit at the weighing point.

Freestanding ladders are used in the closely planted groves.

Stocks of oranges loaded for transport from the grove to the packing houses.

Tangerines packed in the grove for the local market. The boxes are covered with banana leaves.

A packing house near Tripoli. Note the donkey used to bring fruit from the orchard.

Oranges being graded and wrapped for export.

A worker closing a packed box. Note the split "chestnut" straps which are used to secure the lid on boxes packed for export shipment.

Oranges being wrapped for export. Note the partially packed box.

When the box is packed, it is carried by hand to a place in the packing room where the lid is nailed on and the split "chestnut" boughs fastened into place 4/. These boughs are used in place of steel strapping or wire to secure the lid on the box. The "chestnut" boughs are obtained from Italy and are the same as used in that country.

Packing for the Domestic Market

Fruit for the domestic market is not wrap-packed in boxes; it is either purchased in bulk from a packing house or a grower or is bare-packed in non-export containers in the grove. In one grove visited, where tangerines were being packed for the local market, the fruit was picked, carried to the end of the rows, and piled on the ground. Then it was packed unwrapped and apparently ungraded and unsized in what appeared to be used single-compartment apple boxes. A banana leaf was placed over the fruit as a protection before the lid was nailed on.

As observed, most citrus sold domestically is orchard run and the method of handling depends somewhat on the distance to the primary domestic market, Beirut.

Domestic Citrus Consumption

Domestic consumption can only be estimated in the most general terms. Production in any year is only an estimate and, more important, no record is kept of the large quantity of fruit exported to Syria each year.

Table 4.-Lebanon: Estimated Consumption of Citrus Fruits, 1949-50

Variety	Quantity	
	Metric tons	Boxes
Sweet oranges	12,000	377,931
Bitter oranges	2,000	62,989
Tangerines	2,700	85,035
Lemons	7,000	203,055
Sweet limes	400	12,598
Grapefruit	100	2,756
Total	24,200	744,364

Source: Trade and government. From a report by J. Forrest Crawford.

4/ These split boughs are called "chestnut" by the trade, but they probably are hazelnut and other wood.

Considering Lebanon's estimated population of 1,250,000, the indicated per capita consumption of citrus is quite high, averaging over one-half box per person per year. Despite the dense population of about 1,200 people per square mile in the coastal area, the highest consumption seems to be in the immediate citrus areas and in the larger urban centers of Beirut, Tripoli, Sidon, and Tyre.

Some citrus is cold-stored for sale during the late spring and summer when oranges are in short supply.

Exports

The Shamouti orange, known as "Jaffa" in Europe, is the leading export variety. Some other oranges are exported, but their volume is of minor importance. Exports have been increasing over the past five years, with the exception of 1949 when a poor crop reduced supplies and caused a high domestic price that made exports unattractive. By the third quarter of 1950, however, exports had reached 197,186 boxes, and the total for 1950 is expected to be considerably more than twice that of 1949.

Table 5.-Lebanon: Citrus Exports, 1944-50

Year	Oranges		Lemons		Other citrus	
	Metric tons	Boxes	Metric tons	Boxes	Metric tons	Boxes
1944	0		151	4,380	0	0
1945	0		229	6,643	0	0
1946	1,145	36,060	2,638	76,523	1	31
1947	1,438	45,289	566	16,418	1/	1/
1948	5,678	178,825	1,130	32,779	1/	1/
1949	3,488	109,852	1,216	35,274	242	7,622
1950 2/	6,261	197,186	1,282	37,188	190	5,984

1/ Not available.
2/ First three quarters only.

Source: Official sources, as reported to Mr. Crawford. Does not include exports to Syria.

If orange production increases, exports may also increase, but they are unlikely to exceed 250,000 boxes a year. The domestic market will remain more important and probably more profitable.

Lemon exports are small, and exports of 37,188 boxes in the first three quarters of 1950 were at about the same level as in the past few years. It is unlikely that future exports will increase much above present levels.

Bitter oranges, which are exported chiefly to England for the production of marmalade, will continue to be of minor importance. Future exports will probably be at the level of the first three quarters of 1950, when 5,984 boxes were expected.

Lebanon exports some citrus to its Middle Eastern neighbors such as Syria, Bahrein, Egypt, Jordan, Kuwait, and Saudi Arabia, and her best European customers are Czechoslovakia and France. France has always been an important customer because of the tie between the Lebanese pound and the French franc. Czechoslovakia is a party to a trade agreement with Lebanon which results in this citrus trade.

Of the Middle Eastern importers of citrus from Lebanon, Syria is the most important. The exact amount shipped is unknown and the figures in Table 6 are estimates of probable shipments in the 1949-50 season.

Table 6.-Lebanon: Estimated Citrus Exports to Syria, 1949-50

Item	Sweet oranges		Tangerines		Lemons	
	Metric tons	Boxes	Metric tons	Boxes	Metric tons	Boxes
Estimated Lebanese production	22,000	692,874	3,500	110,230	10,000	290,079
Less						
Estimated local consumption	12,000	377,931	2,700	85,035	7,000	203,055
Reported exports	3,806	119,867			766	22,220
Balance (presumed to exported to Syria)	6,194	195,076	800	25,195	2,234	64,804

Source: From a report by J. Forrest Crawford.

In Table 7 most of the imports are imports into Syria and most of the exports are from Lebanon. Exports from Lebanon to Syria are not included in this tabulation.

The reported trade with Palestine refers to Arab Palestine; there is no official trade with Israel. Since very little citrus is produced in that part of Palestine which is now under the control of Jordan, trade sources expressed the opinion that much of this fruit had probably been smuggled out of Israel and transported across Jordan into Lebanon. Before the establishment of a boycott on trade between Lebanon and Palestine, both Lebanon and Syria imported citrus from Palestine.

Table 7.-Joint Syro-Lebanese Customs Union: Citrus Imports and Exports, 1949 and First Three Quarters of 1950

Item	Quantity				Value			
	1949		1950 1/		1949		1950 1/	
	Metric tons	Boxes	Metric tons	Boxes	Leb. £ per m.t.	U. S. $ per box	Leb. £ per m.t.	U. S. $ per box
ORANGES								
Imports from:								
Palestine	299	9,417	88	2,771	107	0.94	57	0.50
Turkey	3	94	1,561	49,163	162	1.43	50	0.44
Total or avg.	302	9,511	1,649	51,934	108	0.95	50	0.44
Exports to:								
Bahrein			10	315			266	2.35
Belgium			1	32			300	2.65
Czechoslovakia	1,585	49,919	3,988	125,599	289	2.55	220	1.94
Egypt	3	94	21	661	292	2.58		
France	1,339	42,171	440	13,857	260	2.29	261	2.30
Hungary	83	2,614			301	2.65		
Italy	345	10,866	423	13,322	261	2.30	323	2.85
Jordan	18	567	62	1,953	226	1.99	158	1.39
Kuwait	63	1,984	183	5,763	315	2.78	254	2.24
Palestine	3	94			213	1.88		
Saudi Arabia	49	1,543	165	5,197	246	2.17	220	1.94
Sweden			2	63			314	2.77
Syria			471	14,834			17	0.15
Trieste			495	15,590			223	1.97
Total or avg.	3,488	109,852	6,261	197,186	275	2.43	215	1.90
LEMONS								
Imports from:								
Italy	160	4,641			117	1.03		
Turkey	2	58	67	1,944	150	1.32	53	0.47
Total or avg.	162	4,699	67	1,944	118	1.04	53	0.47
Exports to:								
Czechoslovakia	149	4,322	24	696	207	1.83	101	0.89
Egypt	3	87	12	348	292	2.58	325	2.87
France	451	13,083	464	13,460	186	1.64	238	2.10
Italy	329	9,544	289	8,383	114	1.01	100	0.88
Jordan	226	6,556	135	3,916	180	1.59	125	1.10
Kuwait	2	58	11	319	320	2.82	220	1.94
Palestine	52	1,508			148	1.31		
Saudi Arabia	4	116	53	1,538	112	0.99	228	2.01
Syria			294	8,528			164	1.45
Total or avg.	1,216	35,274	1,282	37,188	166	1.46	176	1.55

Continued - -

Table 7.-Joint Syro-Lebanese Customs Union: Citrus Imports and Exports, 1949 and First Three Quarters of 1950 - continued

Item	Quantity				Value			
	1949		1950 1/		1949		1950 1/	
	Metric tons	Boxes	Metric tons	Boxes	Leb. £ per m.t.	U. S. $ per box	Leb. £ per m.t.	U.S. $ per box
OTHER CITRUS								
Imports from:								
Jordan	2	63			178	1.57		
Palestine	24	756	26	819	129	1.14	155	1.37
Total or avg.	26	819	26	819	132	1.16	155	1.37
Exports to:								
Great Britain	239	7,527	189	5,952	121	1.07	259	2.28
Jordan	1	32			160	1.41		
Palestine	2	63			220	1.94		
Saudi Arabia			1	32			134	1.18
Total or avg.	242	7,622	190	5,984	122	1.08	258	2.28

1/ First three quarters.

Source: Official and trade sources. Does not include Lebanese exports to Syria.

Table 8.-Syria and Lebanon: Imports of Oranges, 1939-49

Year	Imports 1/
	Boxes
1939	349,272
1940	658,861
1941	47,241
1942	253,844
1943	647,523
1944	992,070
1945	504,539
1946	364,178
1947	271,386
1948	32,672
1949	9,511

1/ Imports are primarily imports into Syria.

Source: Official sources, as reported to Mr. Crawford. Does not include exports to Syria.

The imports of oranges from Turkey in 1950 are the result of Syria's sale of wheat to Turkey in the fall of 1949. In part payment for this wheat, Turkey exported citrus fruit, as well as other agricultural products, to Syria.

It is interesting to note the difference in the value per box of exports and imports. The export price seems to range from two to four times the import price.

1951 Market Prospects

The larger crop in 1950-51 may present marketing problems if Lebanon cannot export to Syria. Syria and Lebanon have a customs union, but Syria's market is not always open for the import of Lebanese citrus. In late 1950 the Lebanese Government was therefore considering a subsidy of 1 million Lebanese pounds to aid the citrus industry, with the exporter to be paid 1 pound (27 U.S. cents) for each box of fruit exported. Another plan under discussion was to erect a juice extracting plant to absorb domestic "surpluses." At this writing there is no information as to the outcome of these discussions; the plans are mentioned here only to show the situation of the citrus industry.

The need for such a subsidy is tied in with the difficulty experienced in export shipments. It is expected that some fruit will be exported to Western Germany this year, and recent reports indicate that increased exports of oranges are being made to Sweden to pay for automatic Swedish telephones which are being installed in Lebanon. However, some recent export shipments have shown more than 25 percent decay, and subsidies may be necessary to cover the losses incurred.

Decay is one of the biggest obstacles to the development of an export trade, and only a major program will correct this problem. The program must start with better orchard practice, improved picking methods, and the installation of washers at the packing houses. It is unlikely that all this will be accomplished for some time, so the future of Lebanon's exports is uncertain. Some exporters are using diphenyl-impregnated tissue wraps, and some are investigating the possibilities of using fruit sterlization processes, but better packing-house practices will not achieve much unless orchard practices are also improved.

SOME OTHER ECONOMIC FACTORS

Taxation

Lebanon is primarily an agricultural country, and at present the Government policy on taxation is favorable to the citrus industry. Young groves are free from tax until they reach bearing age in 5 to 7 years. There is then a tax of about 25 pounds per hectare ($2.81 per acre), plus a tax on the value of the crop.

Wages

Wages are low and there is an abundance of unskilled labor. The labor problem has been acute in the last year, owing to the presence of thousands of Arab refugees from Palestine. Although these refugees are supposed to be only temporary residents, they are currently part of the available labor force, and have added to an already saturated labor market.

Table 9.-Lebanon: Cost of Wages and Materials in the Citrus Industry, 1950 1/

Item	Lebanese pounds	U.S. dollars
Wages per day		
Labor for orchard digging (cultivation)	3-4	0.83-1.11
Skilled labor, pruning	6	1.67
Women for packing-house work	1.50-2	0.42-0.56
Materials		
Chile nitrate, 16 percent (metric ton)	250	69.44
Export boxes (each)	1.10-1.25	0.31-0.35

Source: Trade sources. Rate of exchange in November 1950: 3.60 Lebanese pounds = 1 U.S. dollar.

Prices

The average wholesale citrus prices reported from Beirut for the 1949-50 season indicate that Lebanese citrus growers have been receiving very profitable prices for their fruit.

The very high prices paid for oranges and lemons in May and June 1950 reflected the end-of-season short supply. Only small quantities were sold at these high prices.

Some early fruit was also sold at high prices; in October 1950 sweet limes and lemons and tangerines brought $4.41 per box wholesale.

Table 10.-Lebanon: Average Wholesale Prices for Citrus in Beirut November 1949 to October 1950

Month and year	Oranges		Lemons		Tangerines and sweet limes or lemons	
	Leb. £ per m. t.	U.S. $ per box	Leb. £ per m. t.	U.S. $ per box	Leb. £ per m. t.	U.S. $ per box
1949						
Nov.	200	1.76	170	1.63		
Dec.	250	2.20	250	2.39		
1950						
Jan.	250	2.20	250	2.39		
Feb.	280	2.47	250	2.39		
Mar.	300	2.65	250	2.39		
Apr.	370	3.26	280	2.68		
May.	600	5.29	350	3.35		
June	750	6.61	450	4.31		
July			600	5.75		
Aug. 1/						
Sept. 1/						
Oct.	250	2.20	250	2.39	500	4.41
Nov.	200	1.76	2/	2/	2/	2/

1/ Not available, no seasonal sales.
2/ Not available.
Source: As reported by trade sources to Mr. Crawford.

PRODUCTION COSTS

The estimated cost of orange production per hectare given in Table 11 is an example of costs incurred in the operation of a grove on the highest standards used in Lebanon today. As most groves are not given proper pest control treatment and receive less fertilizer than indicated in the table, the average of these items would probably be lower. However, the cost of irrigation might be higher than shown, particularly where water is pumped from a depth of 60 feet, as on some groves visited. The labor cost in the table is probably high; in some groves it would be half the figure indicated.

Production of 20 metric tons per hectare (255 boxes per acre) in solidly planted orange groves is a conservative estimate. Some groves have a higher production; others which receive less than optimum care have a production of 10 metric tons per hectare (127 boxes per acre).

In the production figures and in the costs of operation it should be remembered that few groves in Lebanon are planted to citrus alone and that much income in mixed plantings comes from other crops such as bananas and loquats.

The cost of production as computed, ranging from a low of 71 U.S. cents per box to a high of $1.43 per box, should be considered as conservative and probably higher than average.

Table 11.-Lebanon: Estimated Cost of Operation of a Well-Cared-For Citrus Grove, Not Mixed Culture, 1950

Item	Cost of operation	
	Lebanese pounds per hectare	U.S. dollars per acre
Cultivation: 1/		
Labor - 350 working days at 3.00 Lebanese pounds per day	1,050	118.04
Fertilization:		
Nitrates (est.)	40	4.50
Manure (est.)	100	11.24
Taxes	25	2.81
Pest control:		
Oil spray once a year, rent of machine and material	40	4.50
Labor	80	8.99
Lime sulfur spray twice a year, 60 pounds per application, labor, and material	120	13.49
Irrigation, 6 applications per year:		
Labor	42	4.72
Water	20	2.25
Other costs, maintenance, etc.	100	11.24
Total	1,617	181.78

1/ One man can care for about 1 hectare of grove.
Source: Information compiled from trade sources and inquiries in the field.

Table 12.-Lebanon: Estimated Cost of Citrus Grove Operation per Hectare, per Acre, and per Box, Stated Production Levels, 1950

Item	Cost of operation	
	Lebanese pounds per hectare	U.S. dollars per acre
Total cost of operation	1,617.00	181.78
	per box	per box
Cost per box:		
20 metric tons per hectare (Shamouti)	2.57	0.71
10 metric tons per hectare (other varieties and conditions)	5.13	1.43

Source: Compiled from official sources.

Costs of picking and packing are a fair estimate of the cost of this operation (Table 13). The low labor cost makes the cost of packing competitive with other Mediterranean citrus areas.

Table 13.-Lebanon: Estimated Cost of Picking and Packing Oranges for Export, 1950-51

Item	Cost per 30-33 kilo (66-73 lb.) box	
	Lebanese pounds	U.S. dollars
Box	1.25	0.35
Paper wraps	.35	.10
Chestnut straps and nails 1/	.15	.04
Total material	1.75	0.49
Picking, transport to packing house, cleaning fruit, sizing, wrapping, packing, labor	1.00	0.28
Truck transport to port	.25	.07
Lighterage from dock to ship and port taxes	.45	.12
Other costs	.05	.01
Total cost	3.50	0.97

1/ May be hazelnut or other wood furnished by Italy for this purpose.

Source: Trade sources.

Break-even cost as computed with a high of $2.40 and a low of $1.68 per packed box f.o.b., Lebanon is, like the other costs, probably high. Comparing these costs with the average export price it will be noted that adequate returns are received in most cases.

Table 14.-Lebanon: Estimated Range of Break-Even Costs f.o.b., Lebanese Ports

Item	Cost per box			
	High		Low	
	Lebanese pounds	U.S. dollars	Lebanese pounds	U.S. dollars
Cost of production	5.13	1.43	2.57	0.71
Cost of picking and packing	3.50	.97	3.50	.97
Break-even cost f.o.b., Lebanon	8.63	2.40	6.07	1.68

Source: Compiled from official sources.

A large quantity of fruit is sold domestically at relatively high prices. When it is considered that little cost is incurred in preparing the fruit for this market it will be seen that the local fruit trade is very profitable to growers.

The break-even costs are comparable to those in other Mediterranean areas. If the problem of decay could be solved, Lebanon would be in a competitive position.

The freight from Lebanon to England is about 5 shillings (70 U.S. cents) per box. At a price of 20 shillings ($2.80) f.o.b., Lebanon, fruit could be sold in England at 25 shillings ($3.50) per box, and exporters would more than break even on the rather high costs estimated here. In February 1951, Israel's Shamouti were selling in small volume in England at over 40 shillings ($6.60) per box.

PROCESSING

Very little citrus is processed in Lebanon, and the present small production is consumed domestically.

The bitter orange tree is the source of most Lebanese processed citrus products. The blossoms are collected and distilled into an essence called "Mazahr," which is probably similar to, or the same as, neroli or orange-flower oil. "Mazahr" is used locally in the manufacture of Arabic sweets. Some bitter orange blossoms are candied and used on sweets and cakes. The fruit of the bitter orange is used in marmalade. Seville oranges are also used in making orange peel candy and orange peel preserves, products which are considered delicacies in Lebanon.

Very few sweet oranges or lemons are used for the production of juices. Varieties such as the Baladi and the Shamouti are suitable for processing, but development of a processing industry is hampered by insufficient volume of production and by the Mediterranean fruit fly. In infested areas such as Lebanon it is pratically impossible to produce a high-quality orange juice product because the fruit fly larva and maggots appear in the juice.

CONCLUSION

The citrus industry in Lebanon will probably remain a small industry, based on hand-cultivated groves. While some new acreage suitable for citrus production is being brought under irrigation in South Lebanon, there is no assurance that it will be used for citrus. It may well be turned over to the production of bananas and other more profitable crops. Since the local market is so profitable and since there has been no premium price for clean export fruit, there has been no incentive to improve orchard practice and eliminate the damaging scale pests.

Lebanon could compete with other citrus exporters if the industry were organized to take advantage of it. Destruction of producing groves in Israel will reduce that country's citrus production for several years and also the quantity of Shamouti oranges available for the market. Lebanon produces the Shamouti orange which is generally larger than other

varieties, such as the "whites" from Sapin, with which it competes. On the basis of quality, Lebanon could be competitive in Europe, if the small quantities exported were properly distributed and merchandised. This advantage would be limited to markets where the Shamouti is appreciated, and the fruit would have to be delivered in a sound condition.

Despite such opportunities, it seems likely that the citrus industry in Lebanon will continue to be most interested in supplying the domestic market and in exporting primarily to its Middle East neighbors. As far as Europe is concerned, Lebanon will probably be important only as marginal opportunities arise in markets where small shipments may be taken to meet requirements when lack of supplies or of foreign exchanges makes citrus unavailable elsewhere.